Micro-smart Grid gives renewable energy wings to fly!

天是黑的
眼是明的
雷是鸣的
心是静的

China Singyes Solar Technologies Holding Limited

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Content

I. The Development of China Micro-smart grid

II. The case introduction of Micro-smart grid

1、The development of the micro-smart grid in China

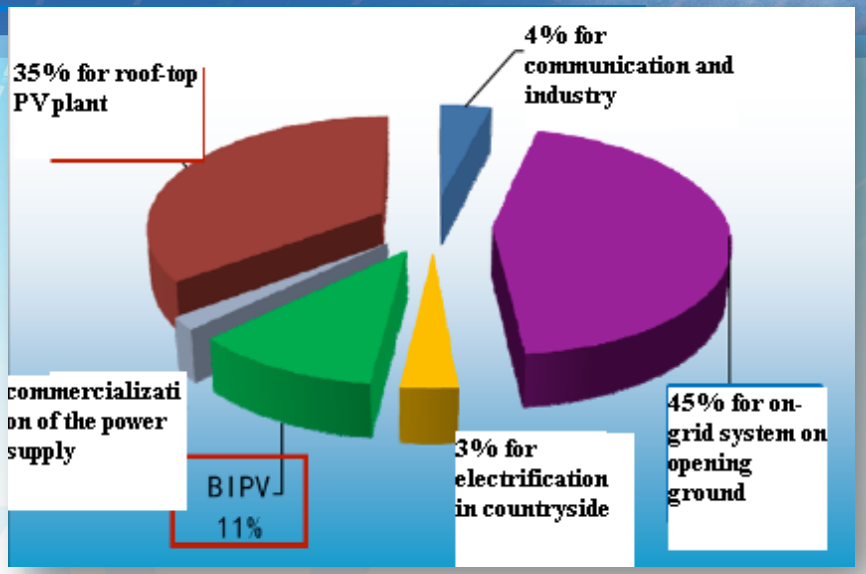
The prediction of the installedcapacity and the electricity quantity of 2020

type	Installed capacity (GW)		Generated Electricity (TWh)	
	Capacity (GW)	Proportion (%)	Generated Electricity (TWh)	Proportion (%)
Coal power	1020.00	60.36	4720.0	68.31
Water power	300.00	17.75	1000.0	14.47
Nuclear power	70.00	4.14	370.0	5.35
gas	50.00	2.96	220.0	3.18
Wind power	150.00	8.88	300.0	4.34
Solar energy	100.00	7.0	125	2.0
others	50.00	2.96	225.0	3.26
total	1690.00	100.00	6910.0	100.00

Remarks:predicted by the PV committee of China

1、The development of the micro-smart grid in China

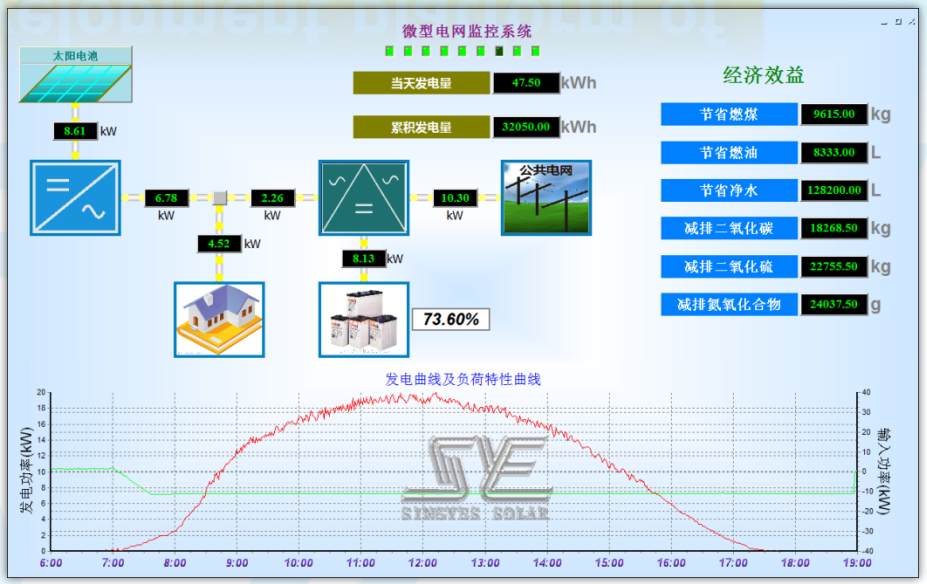
PV installation type and proporation



- Centralized PV stations are normally installed in the west of China, most of them are high-voltage grid-on which is 30% of total power generation in the west.
- Most PV power systems are fixed on the roof in the east of China, by called BIPV or BAPV which normally are Low- voltage grid –on .
- EPIA predicts that off-grid and micro-grid PV plants will accounts for 30% of whole power generation in the world by 2030.
- The wind-generation system and PV power factory without Energy saving will be out of time as renewable resources coming to our life.

2、The case introduction of micro-smart grid

The experiment development platform of the micro-smart grid

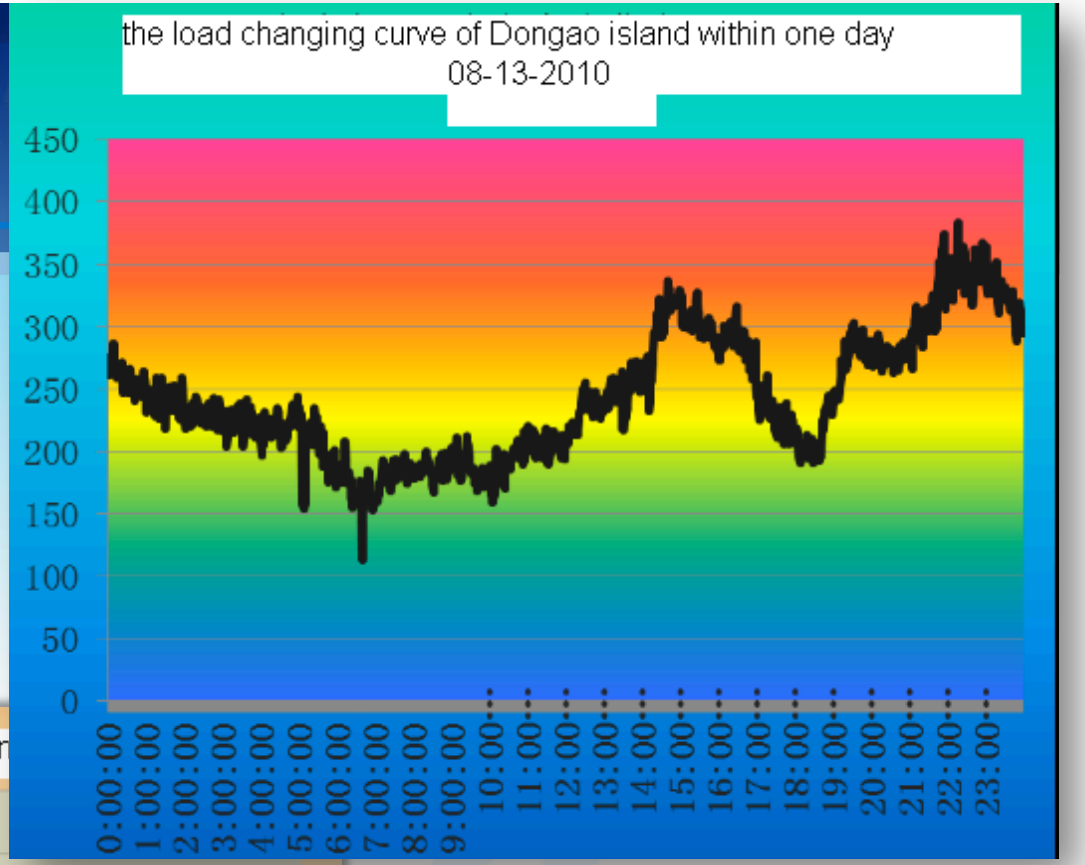


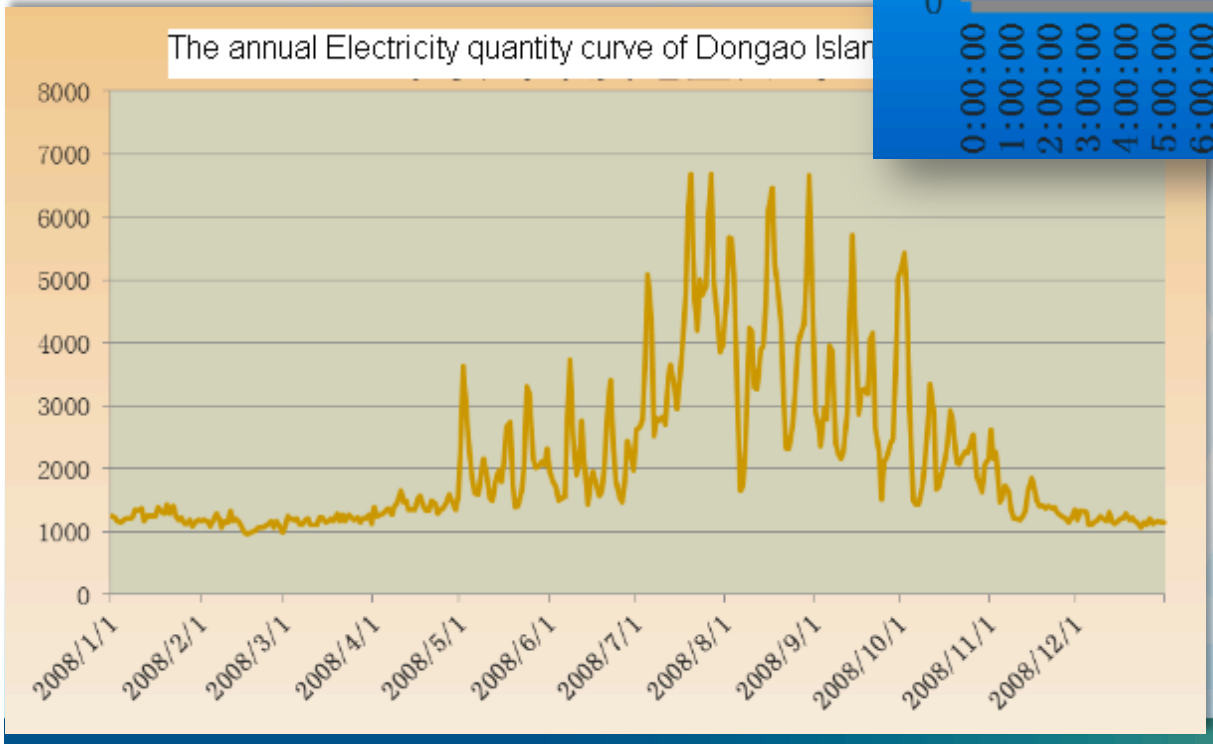
The micro-grid system from the HQ of Singyes

2、The case introduction of micro-smart grid

The introduction of Dongao Micro-smart Grid —The first commercialized Micro- grid power system on the isolated island of China

1、The original power grid of Dongao island





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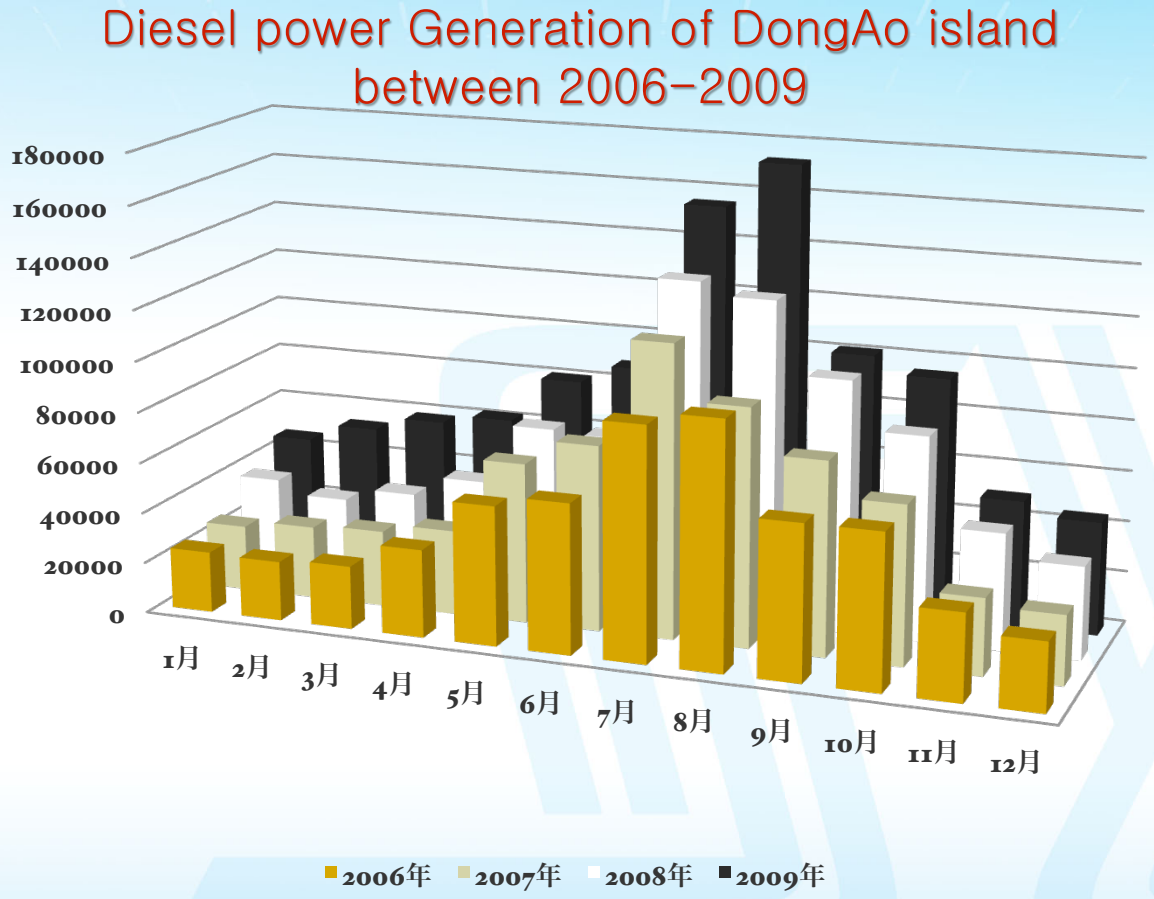

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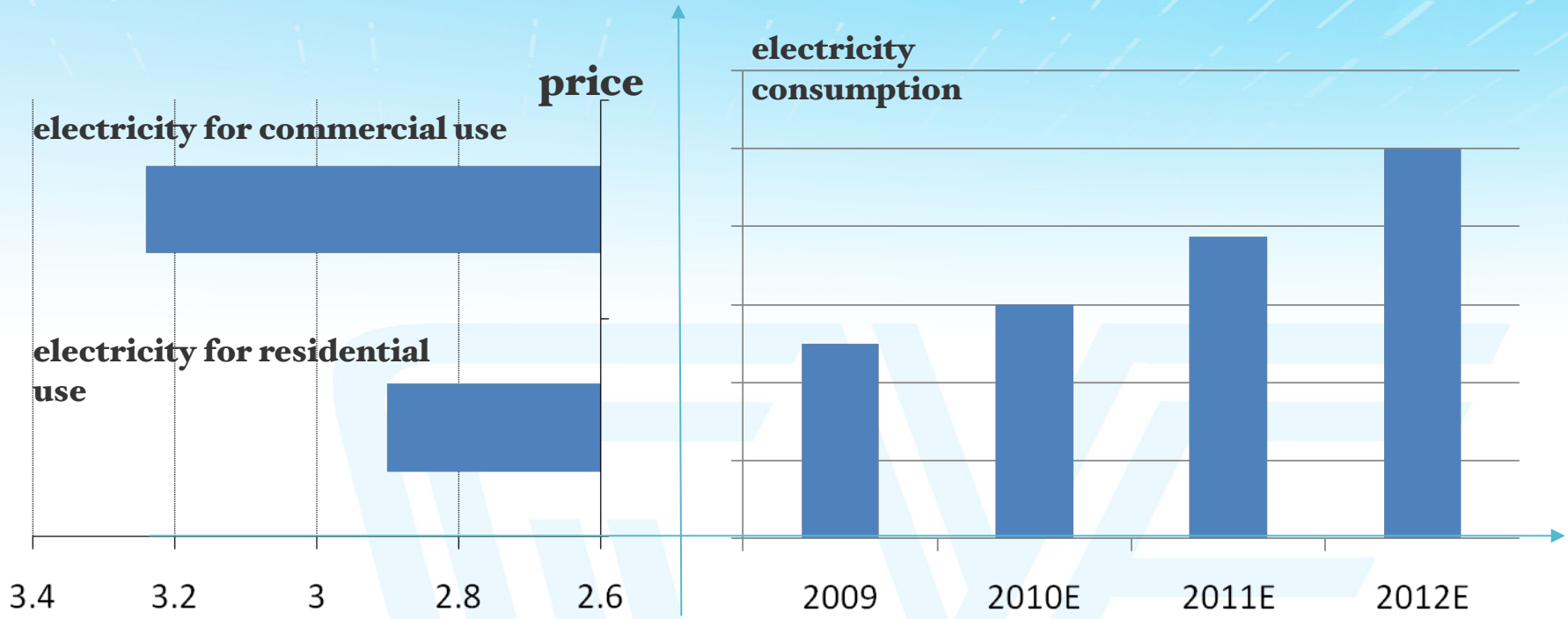


Before the Dongao island is renovated:

◆0.47 US electricity unit for residential use,0.62 US electricity for commercial users, 0.16 US from the government subsidy

◆The electricity consumption is 80 million kwh in 2009.By estimation the annualelectricity consumption will increase rapidly.

2、The micro-smart grid of Dongao island consists of:

2、The micro-smart grid of Dongao island consists of:

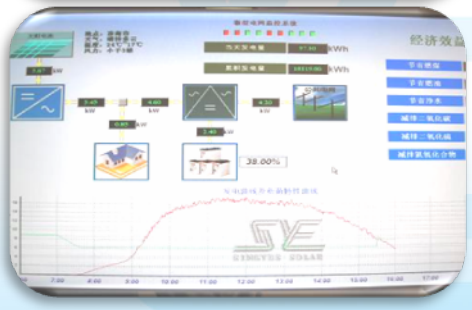
- PV culture center
- the main PV power generating system

- wind power generator
- wind power system

- PV on-grid cabinet
- PV on-grid system

- wind power on-grid cabinet
- wind power on-grid system

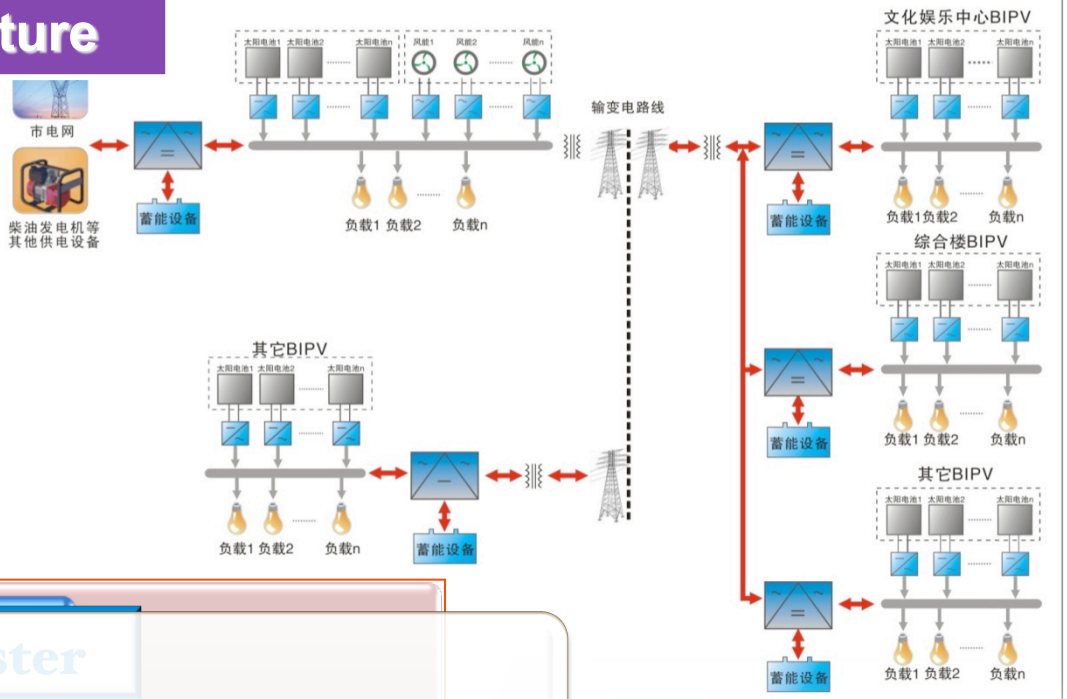
- multy-current controller
- the key control component



- energy management system
- remote monitoring system
- Android cell phone remote monitoring platform

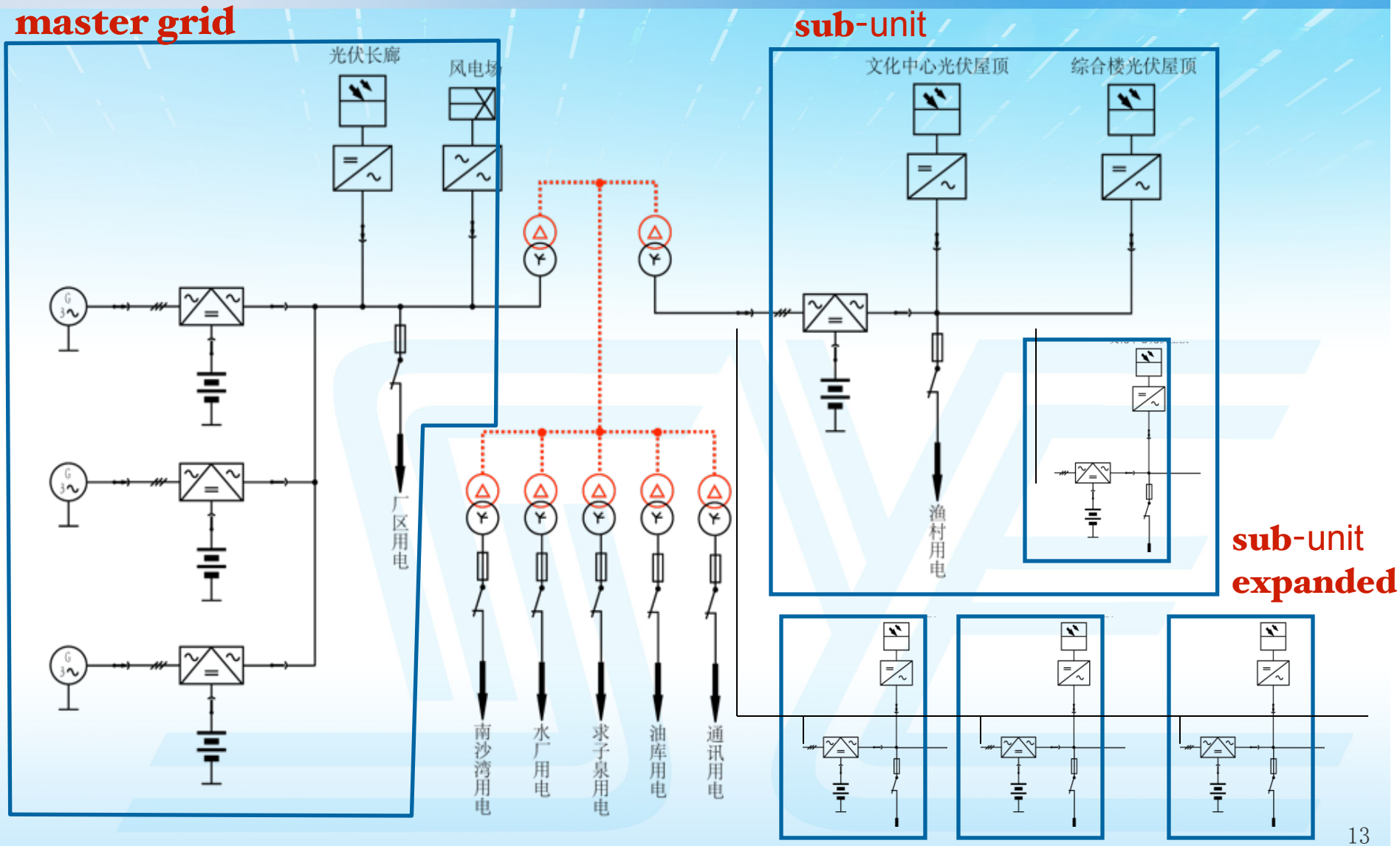
DongAo island-Singyes Solar Micro-smart

3、 multistage controlling structure

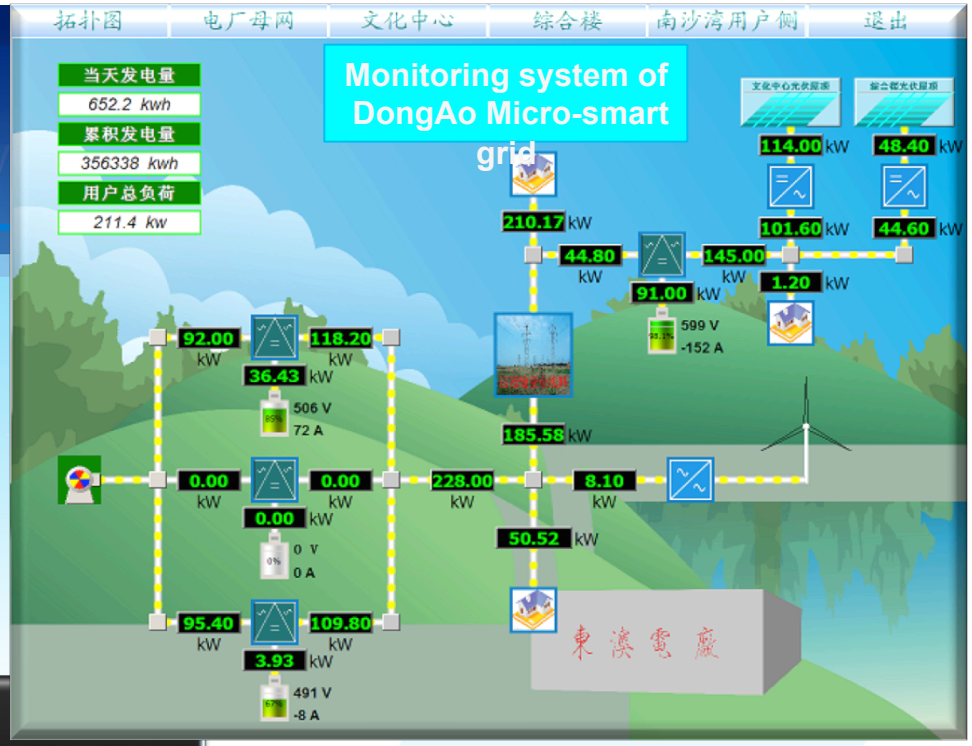


- first-level
  - Multistage controll
- Second
  - Single unit operated independently
- Thi
  - Each unit can be expanded
  - Power transfer between units

3、 multistage controlling structure

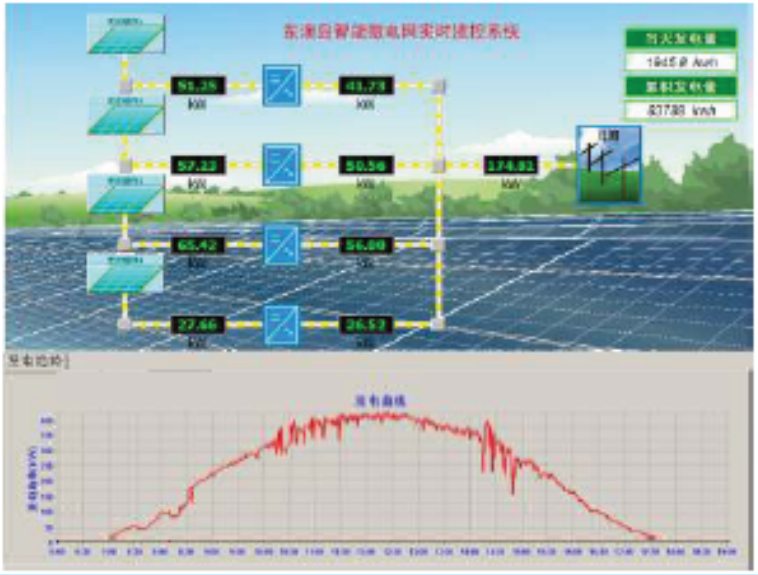


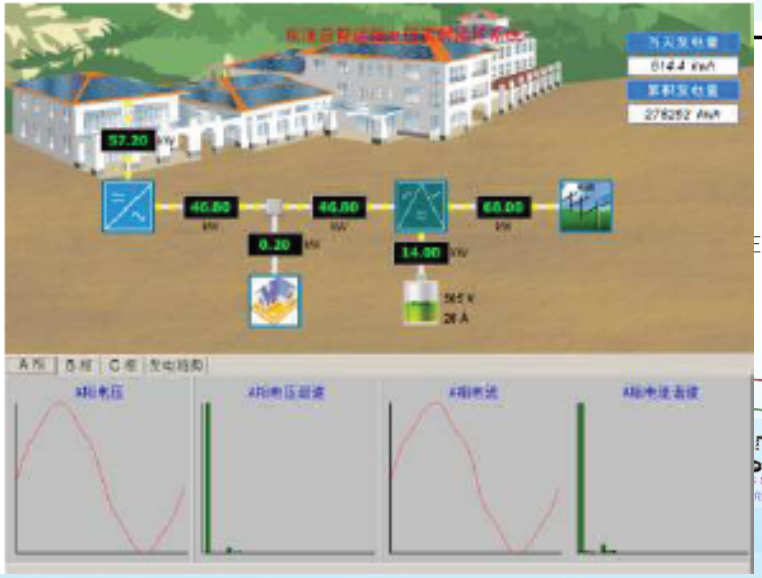
4、Energy managing system



- Date collection and monitor
- Devices auto-control parts
- Power generating estimation by real-time
- Energy using efficiency
- Safety warning

4.1.Data collection and monitor





4.2 Devices auto-control parts

Diesel Generator

- To detect and control the oil pressure of the diesel engine
- To detect the status of the diesel engine
- Automatically start and control the diesel engine

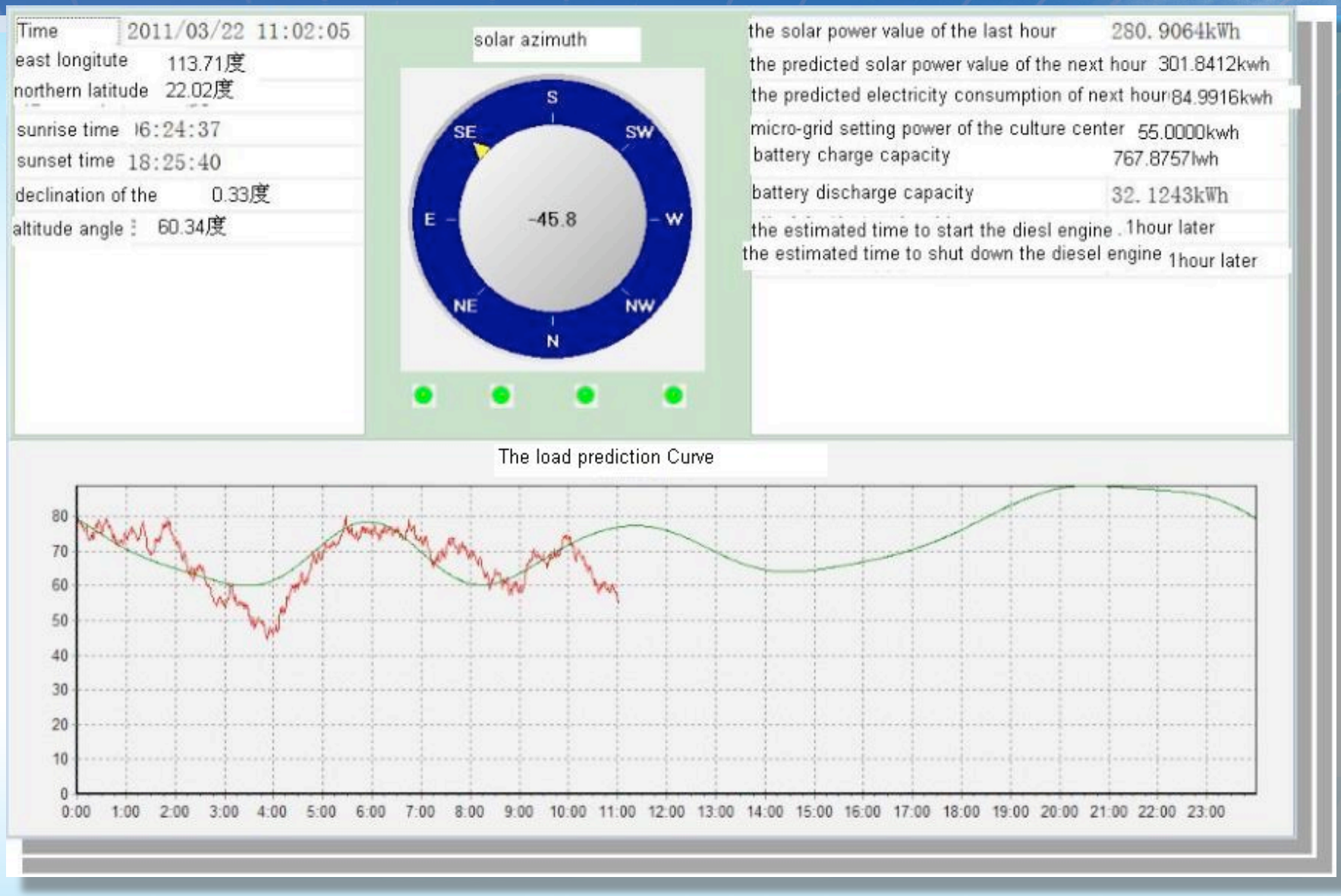
PV power plant

- PV intelligent junction box
- PV intelligent confluence box
- PV cable on-line inspection

Energy-saving system

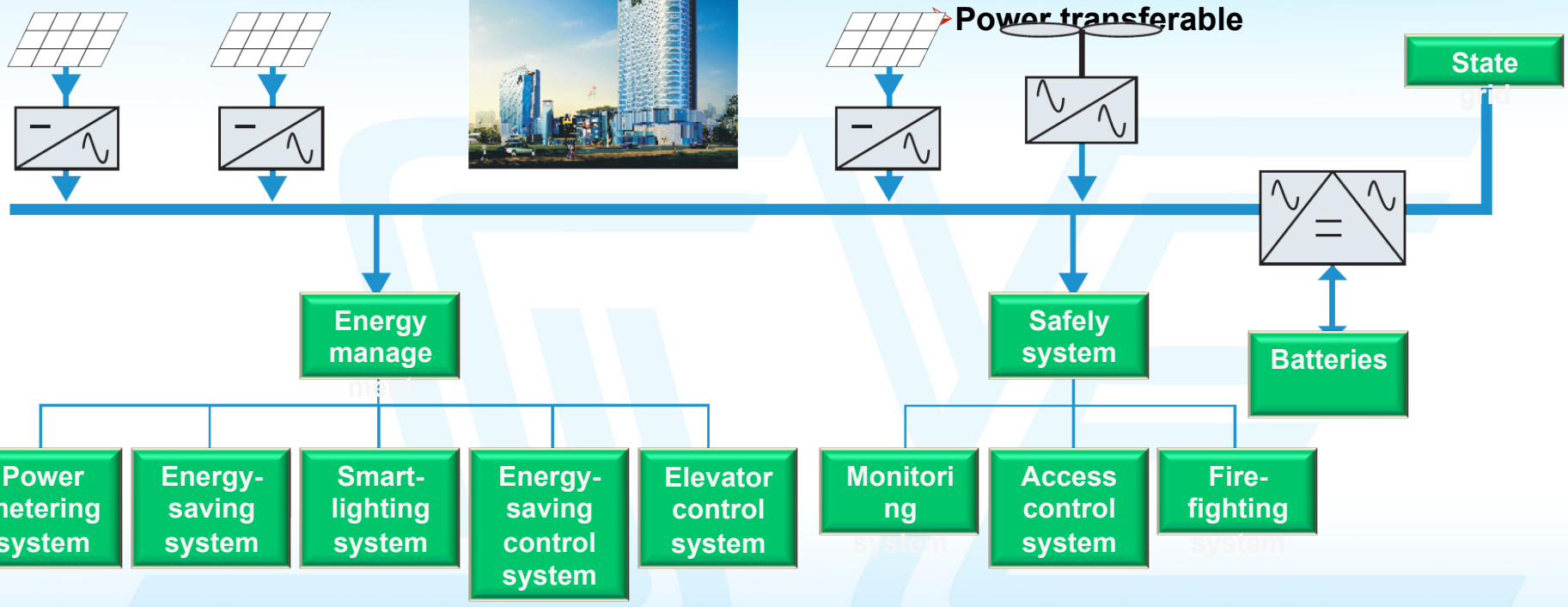
- Battery on-line monitoring and control
- Battery working environment monitoring

4.3 Power generating estimation by real-time—Energy estimation



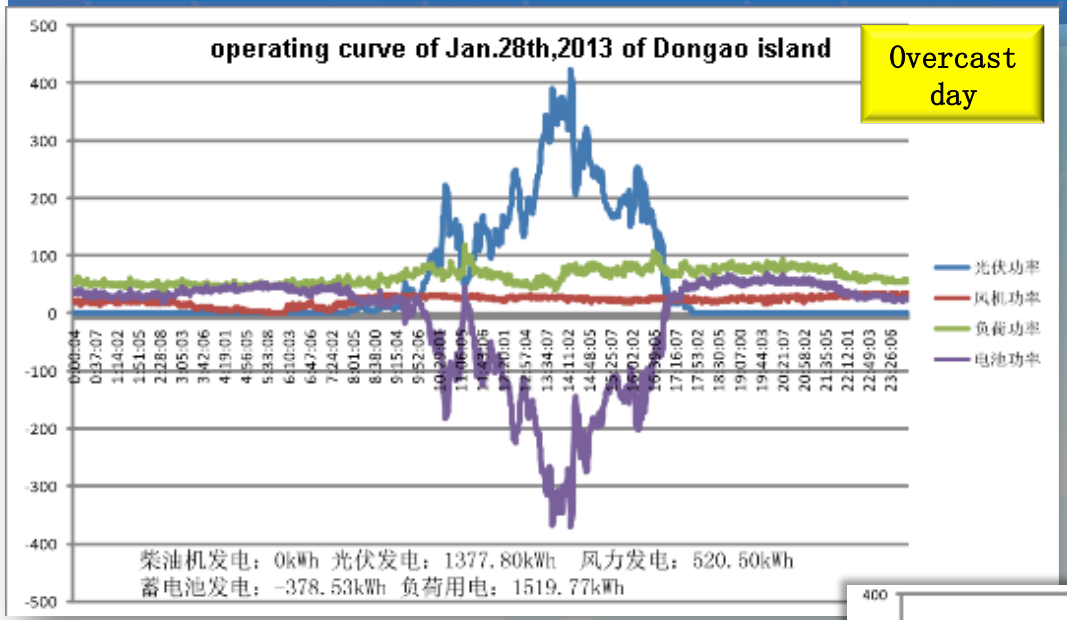
4.4 Energy using efficiency-- Separate controlling

- Separate controlling for loading system
- data collection from intelligent meters
- Energy saving management
- Power transferable



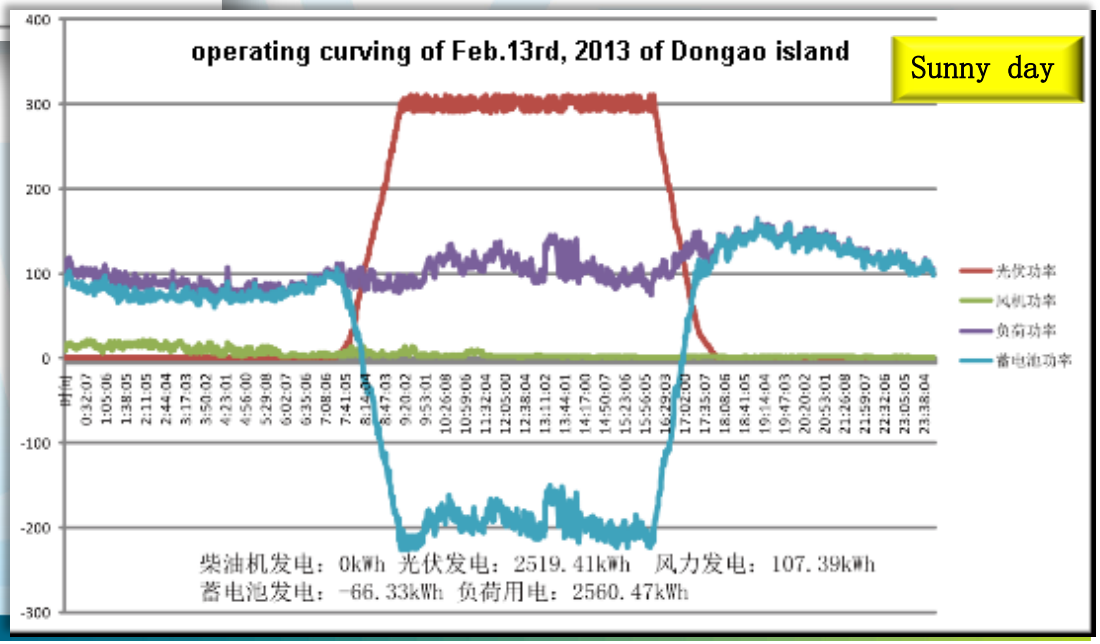
5.The effect of the DongAo island micro-smart grid

workday curve in off season



The micro-smart grid energy control: power-limit operating, after the micro-smart grid control is changed to power-limit operating the solar power generation curve are totally different with the solar radiation variation tendency.

In off season, even if in overcast day the solar power generation can meet the requirements of the whole day load consumption.



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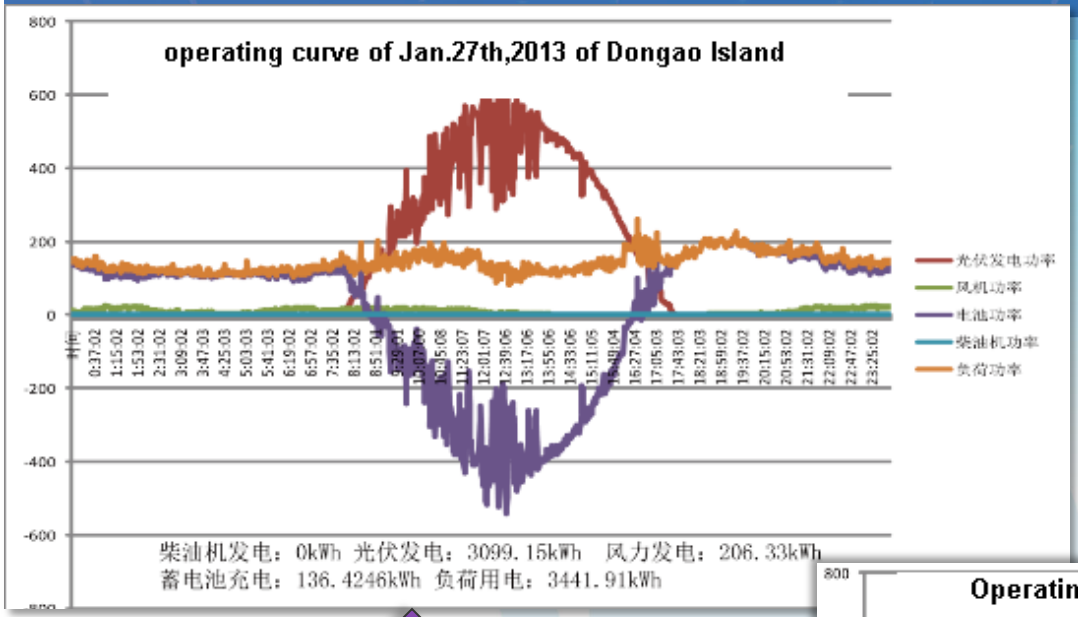
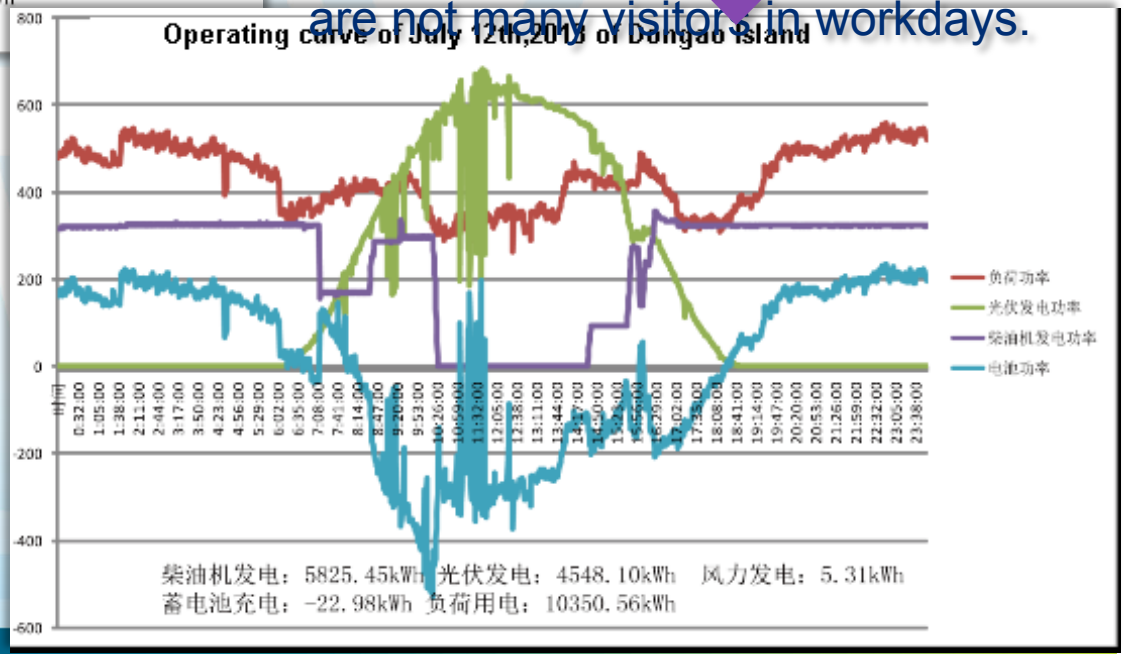


busy season workday curve

The electricity consumption sharply increases in summer. The fluctuation of the load also increases. The limit of the solar power generation is fully lifted. It is possible that the diesel engine will shut down because there are not many visitors in workdays.

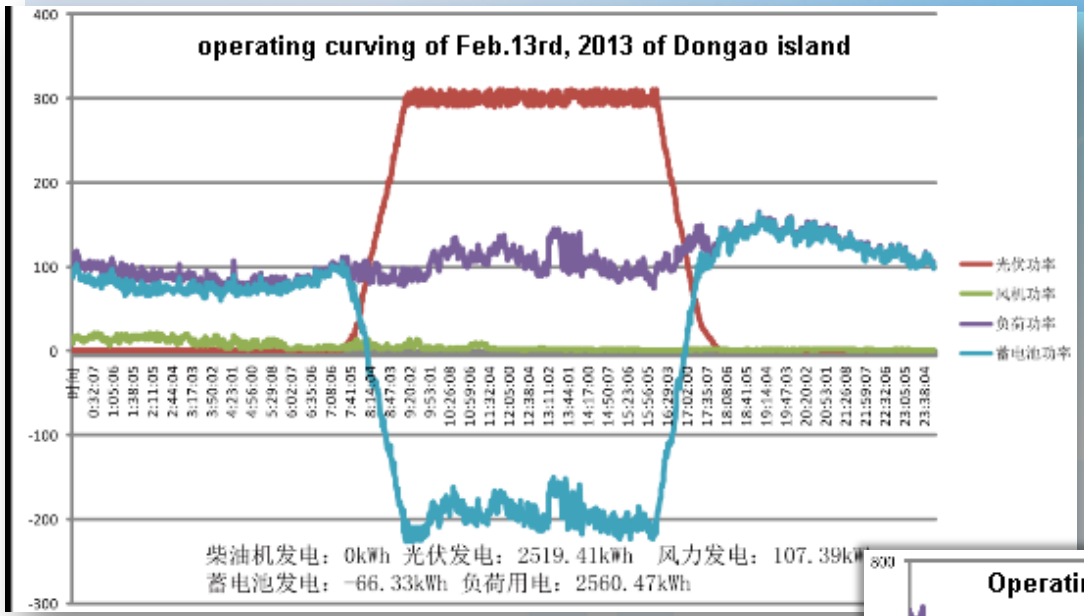
The micro-smart grid energy control: disconnect the solar power generation in advance. Part of the solar power is cut off. The overall power generating curve is the same as the variation tendency of the solar radiation

off season holiday curve

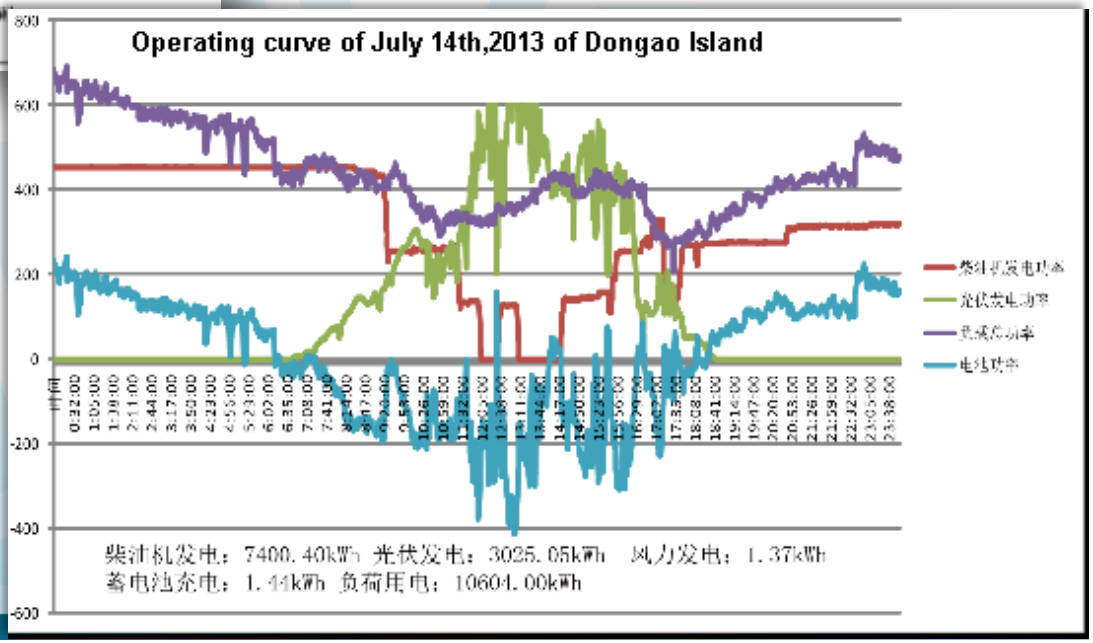


5.The effect of the DongAo island micro-smart grid

busy season holiday curve



In summer, especially in the cloudy days it is possible that the diesel engine will shutdown/ start .



The change in load in the morning of Saturday is similar to that of Friday. With the increase of the number of visitors the load will increase in the afternoon. The operating time of the diesel engine markedly increases.

5.The effect of the DongAo island micro-smart grid

Month	Generating capacity of the PV	Generating capacity of the wind turbine	Generating capacity of the diesel engine	the proportion of the Generating capacity of the renewable energy	The total Generating capacity
Jan, 2011	58728.95	8470.10	6443.33	91.25%	73642.38
Feb, 2011	48829.97	7555.86	10531.49	84.26%	66917.32
May, 2011	58923.42	7041.41	14094.55	82.39%	80059.38
April, 2011	68314.28	6007.66	17397.26	81.03%	91719.20
March, 2011	82453.89	5301.15	32187.37	73.16%	119942.41
June, 2011	85251.70	6254.33	46574.65	66.27%	138080.68
July, 2011	96455.49	6158.06	70785.58	59.18%	173399.13
August, 2011	90038.09	5663.63	82903.62	53.58%	178605.34
Sep, 2011	81864.22	6151.54	58231.74	60.18%	146247.50
Oct, 2011	82064.96	9835.81	29477.67	75.71%	121378.44
Nov, 2011	71325.37	10464.40	13025.63	86.26%	94815.41
Dec, 2011	63201.68	8388.50	8896.23	88.95%	80486.41
合计	887452.01	87292.45	390549.12	71.39%	1365293.58

5.The effect of the DongAo island micro-smart grid

	The original diesel engine power plant	The micro-smart grid
Diesel power generator efficiency	oil consumption:317gram/kWh	oil consumption:220gram/kWh
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P		
e		e
cost.	The total electricity generation is one million kwh in 2009. The diesel oil consumption is 322.451 tons. The exhaust gas is 3.86941million cm^3, which includes 4252 tons of co2, 0.323 tons of smoke and 3.223 tons of so2.	The total electricity generation is 1.4 million kwh in 2011. The diesel oil consumption is 86.148 tons. The exhaust gas is1.34391million cm^3, which includes 1136 tons of co2, 0.086 tons of smoke and 0.861
Environment		

The analysis of the return of investment

- **The 300kW system of the first phase is completed in 2009.The construction is completed in 2010**
- **The total investment is 3.5 million USD, the government subsidy is 50%.**
- **The electricity price: 0.6 US electricity unit for commercial users, 0.3 US electricity unit for residential users. The electricity consumption proportion of the commercial users and the residential users is 7:3.**
- The annual electricity generation is around 1.7million kWh. The electricity generation from the renewable energy is around 1.25 million kWh.
- The operating cost is **about 160,000USD** /year. It will take 2 to 2.5 years to recover the

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Thank you !